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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/086,289	03/01/2002	Volker Hohmann	P02,0077	2054

26574 7590 11/15/2004

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EXAMINER	
JACOBSON, TONY M	
ART UNIT	**PAPER NUMBER**
2644	

DATE MAILED: 11/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/086,289	HOHMANN ET AL.	
	Examiner	Art Unit	
	Tony M Jacobson	2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 March 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 March 2002* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6/02, 5/03, 12/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 5 and 9 are objected to because of the following informalities: At line 6 of claim 5, "feedback-conditions oscillations" appears to be a typographical error for "feedback-conditioned oscillations"; and at line 3 of claim 9, it appears that one or more words were omitted between "distanced" and "the" (e.g. "distanced ***from*** the first microphone ..." or equivalent). Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. **Claims 1-16** are rejected under 35 U.S.C. 102(e) as being anticipated by Westermann (US 6,549,633).

4. Regarding **claims 1 and 9,** Westermann discloses in Figs.1-3 a hearing aid system (i.e., a "hearing aid device" or "hearing device system") comprising: at least one first microphone (18r of Fig. 2) configured to generate a first microphone signal (inherently); at least one second microphone (18l) distanced [from] the first microphone, configured to generate a second microphone signal; a signal processing unit (24r and/or 25r) configured to process the first microphone signal and the second microphone signal; a comparison unit configured to compare the first and second microphone signals or signals derived from them and to recognize feedback-conditioned oscillations; and a feedback-conditioned oscillation reducer. Both of the latter are elements are present in binaural DSPs 24r and/or 25r. A feedback suppression, as described at column 8, lines 36-52, by which tone signals [oscillations] deviating from the overall sound image are suppressed without suppression of tone signals in the overall sound signal or [equivalently] in the right and left side at the same time, accomplished by a feedback suppression system to which a residual feedback signal representing the difference feedback signals from the actual and simulated sound processing channels [same-channel and opposite-channel] is supplied inherently requires a comparison unit to determine said difference feedback signals, and said suppression of feedback inherently requires a "feedback-conditioned oscillation reducer". Accordingly, the

method performed by the binaural hearing aid system of Westermann in normal operation comprises generating a first microphone signal from at least one first microphone (18r); generating a second microphone signal from at least one second microphone (18l) that is distanced from the at least one first microphone; comparing the first microphone signal and the second microphone signal (inherently necessary to determine a difference feedback signal, as recited at column 8, lines 42-47); recognizing feedback-conditioned oscillations based on the comparing; and reducing the feedback-conditioned oscillations when they are recognized as such (as described at column 8, lines 36-52).

5. Regarding **claims 2 and 10**, as illustrated in Figs. 2 and 3 of Westermann, the system comprises a first microphone signal oscillation detector (21r) configured to detect an oscillation and determine a first oscillation frequency in the first microphone signal (by dividing the input signals into a plurality of bands, the band dividers will inherently detect input oscillations and determine the frequencies of the input oscillations, to a certain resolution, depending on the number of individual bands employed); a second microphone signal oscillation detector (21ls) configured to detect an oscillation and determine a second oscillation frequency in the second microphone signal; and a comparison unit configured to compare the first oscillation frequency and the second oscillation frequency (inherently comprised in binaural processors 24r and/or 25r as described above regarding claims 1 and 9), and thus, in normal operation, recognizes feedback-conditioned oscillations by determining that an oscillation

frequency is present in only one of the first microphone signal and the second microphone signal, as broadly as disclosed and claimed.

6. Regarding **claims 3 and 11**, Westermann discloses at column 8, lines 36-52 a sophisticated noise or feedback suppression, by which tone signals deviating from the overall sound image may be effectively suppressed without suppression of tone signals present in the overall sound signal or in the right and left side (first and second microphone signals) at the same time. This constitutes performing a correlation analysis of the first and second microphone signals and determining that a feedback-conditioned oscillation is present at frequencies at which no correlated signal parts for an oscillation in the first microphone signal are present in the second microphone signal (or vice versa), as broadly as disclosed and claimed. Applicant nominally recites in the specification, "a correlation analysis is undertaken for comparing the microphone signals of two distanced microphones for recognizing feedback-conditioned oscillations" (at paragraph [0022], implying a cross-correlation analysis of some sort); "When a hearing aid device of the invention recognizes feedback-conditioned oscillations on the basis of a correlation analysis of the two microphone signals (cross-correlation), then there is a further possibility for reducing these oscillations by suppressing uncorrelated frequency parts of the microphone signals" (at paragraph [0026]); and "The microphone signals proceeding from the microphones are analyzed and compared to one another in the evaluation and control unit 5. For example, oscillations in the individual microphone signals can be detected by auto-correlation analyses. When oscillations are present in

both microphone signals, then their frequencies are identified and compared to one another" (at paragraph [0030]). Thus, it is not clearly indicated what type of correlation analysis Applicant is claiming. The McGraw-Hill Dictionary of Physics and Mathematics, 1978, defines "correlation" generally as "the interdependence or association between two variables that are quantitative or qualitative in nature." In determining which tone signals are present in the overall sound signal (both the left [first] and right [second] microphone signals) and suppressing those tone signals that deviate from the overall sound present in the right and left side at the same time, the method disclosed by Westermann must inherently analyze the association between the left [first] and right [second] microphone signals, and thus can be described as performing a correlation analysis and determining that a feedback-conditioned oscillation is present at frequencies at which no correlated signal parts for an oscillation in the first microphone signal are present in the second microphone signal (or vice versa). Further regarding **claim 11**, performance of said correlation analysis in the binaural sound processing unit, as disclosed by Westermann, inherently requires inclusion of a correlation calculator (such as a software routine to evaluate the association between the two microphone signals and produce a result based upon the determined association) configured to perform a correlation analysis of the first and second microphone signals.

7. Regarding **claims 4, 5, 12, and 13**, the hearing aid device/system of Westermann further comprises a signal processing unit (24l and/or 25l) having a plurality of parallel channels (see column 6, lines 40-51); and a channel gain reducer configured to reduce hearing aid gain in one of the plurality of parallel channels (inherently present in binaural signal processor (25l) to suppress [reduce] the feedback-conditioned oscillations in that channel as disclosed at column 8, lines 36-52); and accordingly, the method performed in normal operation further comprises performing signal processing in a plurality of channels of a signal processing unit; and reducing a hearing aid gain of a channel in which an oscillation frequency lies when feedback-conditioned oscillations are recognized.

8. Regarding **claims 6, 7, and 14**, the signal processing units (24r/25r and 24l/25l) of hearing aid devices 16 and 17 of Fig. 2 each constitutes an adaptive filter with adjustable operating parameters configured to reduce recognized feedback-conditioned oscillations, and the method performed by the system in normal operation thus comprises reducing recognized feedback-conditioned oscillations by at least one of activating filters and adapting filters as claimed in **claim 6** and providing an adaptive compensation filter for reducing feedback-conditioned oscillations and adapting the adaptive compensation filter when feedback-conditioned oscillations are recognized as claimed in **claim 7**, according to the description at column 8, lines 36-52, as broadly as claimed.

9. Regarding **claim 8**, the method performed by the system of Westermann comprises reducing uncorrelated frequency parts of the first and second microphone signals for suppressing feedback-conditioned oscillations, as broadly as claimed, since difference feedback signals from the actual and simulated sound processing channels (signals that are different in the channel under consideration with respect to the opposite channel according to the general disclosure of Westermann) as recited at column 8, lines 42-47 constitute uncorrelated frequency parts.

10. Regarding **claim 15**, in the hearing aid system of Westermann, the at least one first microphone (18r of Fig. 2) for generating the first microphone signal is arranged in a first hearing aid device (16) of the hearing aid (device) system, and the at least one second microphone (18l) for generating the second microphone signal is arranged in a second hearing aid device (17) of the hearing aid (device) system. (See column 3, lines 62-64.)

11. Regarding **claim 16**, the system further comprises a wireless signal path (between antennae 7r and 7l of Fig. 1 – see column 4, lines 63-66) configured to transmit microphone signals or signals derived from them between the first hearing aid device and the second hearing aid device.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

13. Bürck (US 2,263,233) discloses a "hearing device system" in which signals from two spaced-apart microphones are compared to control the gain of the system to reduce acoustic feedback.

14. Kaiser (US 3,057,960) discloses a hearing device system in which signals from two spaced-apart microphones are compared in a cross-correlation circuit to reduce system gain to uncorrelated signals.

15. Garconnat et al. (US 4,594,695) discloses a hearing device system, which performs a cross-correlation calculation of signals from two spaced-apart microphones in a plurality of frequency bands to reduce spurious noise components.

16. Chabries et al. (US 4,658,426) discloses a hearing device system which receives a main signal containing noise or acoustic feedback components, and a reference signal, filters the reference signal in an adaptive filter to isolate frequency components correlated to the main signal, and subtracts the correlated part of the reference signal from the main signal to produce an error signal. The invention teaches taking either the

adaptive filter output (containing only correlated components) or the error signal (containing uncorrelated components of the main input signal) as the system output, and the relationship of suppressing acoustic feedback to suppressing unspecified noise.

17. Nakamura (US 4,932,063) discloses a hearing device system in which signals from two spaced-apart microphones are processed in a plurality of frequency bands to eliminate correlated frequency components from an output signal.

18. Zurek et al. (US 4,956,867), Marash et al. (US 6,594,367), and Panasik et al. (US 6,778,674) disclose hearing device systems processing signals from two spaced-apart microphones to isolate a desired target signal component, including cross-correlation and freezing of filter adaptation when only the target signal component is detected.

19. Ramm et al. (US 5,568,558) discloses an adaptive noise cancellation device for canceling noise or acoustic feedback in a hearing device system (such as a speakerphone), which utilizes multiple correlation calculations (auto-correlation and cross-correlation).

20. Brander (US 5,991,419) discloses a bilateral hearing aid device system utilizing a wireless link to transfer signals between the two sides for binaural processing, and teaches reducing noise from off-axis, near-side, or far-side by selective subtraction of the signals of microphones of the two sides.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony M Jacobson whose telephone number is 703-305-5532. The examiner can normally be reached on M-F 11:00-7:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forester W Isen can be reached on 703-305-4386. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

tmj
November 8, 2004

XU MEI
PRIMARY EXAMINER